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THE JOURNAL OF PHILOSOPHY

A STUDY OF A PHILOSOPHY OF THE DETERMINATE.

I

THE SITUATION

THIS is the first of three articles on a *Philosophy of the Determinate.* The second will deal with Potentiality, and the third with Structural Analysis. Although inspired by a study of Aristotle, they can not claim to be an exposition of his system, since the emphasis is shifted completely from subject and substance to the situation, which seems to me to be prior not only psychologically, but even ontologically. From this point of departure his very thorough analysis of certain concepts and his proofs of certain fundamental propositions will be seen to lead to a restrained philosophy of the determinate rather than to the cosmological finality of his position.

The situation, therefore, is the fundamental concept of the philosophy of the determinate, and determinateness is the common character of situations. Hence to speak of a determinate situation would be tautology, and to ask what is meant by the determinate is to ask what a situation is, i.e., what is the common character of all situations in virtue of which they are called situations. Only in so far as they possess such a common character are they intelligible and describable as situations. In giving a rough account of this character we are outlining their formal properties which constitute the structure of the determinate. This does not mean that the term "determinate" is applicable only to situations, but that whatsoever admits of its application, does so, if it is not a situation, because it is part of one or the common character of some situations.

Now in every situation there is something going on, something happening, or something continuing to be. This may be taken as the characteristic or defining mark, in the loose sense of definition, since fundamental concepts can hardly be defined. But that there are situations and that they have this character is exactly what the so-called Laws of Thought seem to assert. In the various forms in which they are often stated, they give either the character of situations or the consequences to thought of such a character. In any

case the situation is seen to be ultimate and therefore indefinable, but it admits of description in terms of elements or aspects distinguishable within it. Classification of situations should also be possible according as what is happening is one or more; this would give single and compound situations. The single in turn might be simple or complex. The complex may be said to be "vertically" divisible as distinct from the compound, which are "horizontally" divisible.

This requires some illustration. In the situation referred to by the proposition, "*A* is seeing *B*," there is only one thing going on or happening. It is, in ordinary language, described in two different ways, either in terms of *the active* ("*A* is seeing *B*") or in terms of *the passive* ("*B* is being seen by *A*"). But as Aristotle long ago recognized, the situations referred to by both these propositions are identical. His general analysis of "action" and "passion" is given in *Physics* III–3. Each of these is found to be inevitably bound up with the other; in the end we are led to the conclusion that they are one-sided views of the same activity, process, or actuality, that the "action" of the agent and the "passion" of the patient differ only as the steep ascent does from the steep descent, or the road from Athens to Thebes differs from the road from Thebes to Athens. The activity or actuality is one and the same; it is describable in two different ways.

In what follows we shall therefore use the term "activity" or "actuality" to refer to this single happening in any situation, as distinct from the one-sided descriptions of it. If English permitted the language formations of Aristotelian Greek, a better term would be the what-is-going-on.[1] Event, occurrence, happening, suggest the same thing, as indeed does the very word "situation." It is possible to develop a convenient symbolism to show types of presentation of a single situation. Thus, if *X* is the activity, *A* the agent, *B* the patient, *aXb* would be the full representation of the situation, *Axb* in terms of the active, *axB* in terms of the passive.

In Spinoza we find a similar view of activity. It is clearly expressed in part II of the *Ethics* (De Mente), definition VII: "By single things (*res singulares*) I understand things which are finite and have a determined existence; but if several individuals concur in one *actio* that they are all at the same time the cause of one effect, I consider them all thus far as one single thing." What we have called a single situation having a single actuality, Spinoza would therefore have regarded as a *res singularis.* It is true that in his system the distinction between *actio* and *passio* is a very prominent one; but he certainly never implies that they fall apart. Rather the

[1] It is obvious that we are using these terms to translate ἐνέργεια in its wider sense in which it includes κίνησις as well.

subject in whose nature lies the greatest share of the ground for that single activity is the agent, whereas that in whose nature lies the lesser ground is so far the patient.

The form or structure of a situation, therefore, includes a single activity or actuality and two or more subjects participating in virtue of certain parts of themselves which we shall call grounds for that activity (e.g., the eye in one who sees). There is no relation between the subject and its activity; the latter is the actuality of the former, the former the potentiality of the latter. If there were a relation between the two, they would fall apart and admit an infinity of such relations. We would be left with Bradley's problem of the relation of the relation to the terms. Here it is not a problem [2]; it is solved by the recognition after an examination of what we call situations, that a situation must have in addition to its characteristic activity, subjects participating in that activity, and that *participation in an activity or being thus actualized is not in itself an activity.* Quite simply, being in a state is not possessing it. Things do not possess motion as something additional to themselves; they are or become things-in-motion. Nor is there a becoming of becoming or a change of change; things become and things change. These are their activities or actualities.

We return to the consideration of types of situations, activities or actualities. In a single activity the participation of at least two subjects is necessary, but the activity is one. The part played by either can not be eliminated without destroying the situation. For example, "*A* sees *B*," "Romeo loves Juliet," "Rome attacks Carthage," "*A* is going to Egypt," "*X* is to the right of *Y*." [3] Without *B* being seen, Juliet being loved, etc., there is no situation. Even where language uses the intransitive verb form, there must be more than one participant. "*A* runs," involves the motions of legs over a comparatively hard surface, and both the legs and the surface are indispensable to the activity. Even "*A* thinks" involves intelligible subject-matter.

Compound activities involve primarily co-extensive activities bound into one. For example, "*A* and *B* see each other," "Romeo and Juliet love each other," "*P* and *Q* are going to Egypt," "Rome and Carthage are at war." *A*'s seeing *B* and *B*'s seeing *A* are independent of each other in that either may be eliminated and there still remains a situation, though not the same whole one. Since there are at least two activities, or happenings, and they are co-

[2] Cf. Cook Wilson's reply to Bradley's argument—the business of a relation is to relate.

[3] In the last example, continuing to be, considered as preserving a situation from destruction, may be reckoned an activity. In the logic of situations, rest and motion are equally actualizations or activities.

extensive, the analysis of compound situations may be called *horizontal* division. In the symbolism suggested above, such situations would be represented most adequately by *abXbc*, partially by *ABxba*, *abxBA*, or *AaxbB*.

These are only the primary forms of compound situations. We might have "*A* sees *B* who sees *C*," considered one situation, and many more difficult examples. Two courses are open to us. The first is to deny that compound situations are anything more than aggregates of single ones, since all the activities are independent. This seems strictly a legitimate claim (though a barren one), provided one has a clear conception of what these compound situations are which are asserted to be merely aggregates, and does not carry over the claim to complex situations. To follow the second course, it would be necessary to examine and state the various types of unity which permit the combination of single activities into compound ones. These might be, for example, identity of participating subjects, complete as in "*A* and *B* see each other," or "*A* sees *B* who hears *A*," or partial as in "*A* sees *B* who hears *C*"; specific identity, in addition, of the activity, as in "*A* sees *B* who sees *C*"; the fact of inclusion in a spatial or temporal whole determined in some other manner, etc.

The question seems more than one of agreement on rules and terms. It soon becomes apparent that a whole logic of situations or formal study of the determinate is necessary. It might even be urged, for example, that such a situation as that described by the proposition "Rome attacks Carthage," is not single, for it is analyzable into the many single, often co-extensive activities of individuals and companies in that war. Here it is the problem of collective terms, appearing as that of group participation in activity. Very great consequences in political philosophy follow on the results of such an analysis. Perhaps we should be compelled to admit that single activities arise from the participation of singular subjects, and that what is called collective activity is a compound activity in which a common end or purpose serves as the type of unity. Certainly this is the direction in which the analysis must go, rather than consider "Rome attacks Carthage" just an aggregate of single activities.

The same difficulty may be carried further, even into the realm of single activities where they have a singular subject. In the situation described by the proposition "*A* is wrestling with *B*," it might be argued that *A* is moving his legs, moving his arms, twisting his body, and using his eyes; *B* does likewise. And even the single motion of a single subject is divisible into the motion of its parts. Since the subject is infinitely divisible, so is the activity. There remain very few single activities, only perhaps those like sight and thought.

Now while we may be quite ready to admit that the activity of a group as subject should be treated as compound, because there are co-extensive or independent activities of singular subjects (though bound by some form of unity), it is another matter where the subject is singular, and divisibility rather than dividedness is made the ground of the argument. These activities in which single subjects participate are the type we shall call single *complex* activities.[4] (These shall be distinguished later from single simple activities. Together they constitute single as opposed to compound activities.) The term "complex" is meant to indicate that such an activity is divisible infinitely, and therefore its situation is divisible infinitely, but nevertheless it is not composed of or put together from these divisions into which it may be broken up. The determinate nature of the complex activity is of the utmost importance to the general position which we are describing. From it follows the conclusion that the infinite divisibility of any situation in no way destroys its determinate character. Rather the latter makes the former possible.

Aristotle maintained that no change (in the present terminology, no complex activity or actuality) could be without an end. His frequent examples were that it was nonsense to talk of coming to be white or a cubit long or going to Egypt, unless it can actually be such and be completed. If that can not be completed then something else is happening. If I am going to Egypt, then the single activity of this situation is " going to Egypt." If I can not get to Egypt then it is nonsense to say that I am going there (except as a description of purpose). If I can only reach Greece, then the what-is-going-on of that situation is not "going to Egypt" but "going to Greece." It might be claimed that Aristotle is misinterpreting the opposite view, which would not deny that these changes are completed, but would maintain that they are merely isolated fragments due to the limitation of an infinite change. Thus, "going to Greece" is only a limited part of "going to Egypt," which is only a limited part of something greater. And all this points to infinite motion or change without which the limitation can not be understood. Spinoza, for example, says (*Ethics*, part I, definition 2): "That thing is said to be finite in its kind which can be limited by another thing of the same nature, e.g., a body is said to be finite because we can always conceive another larger than it . . ." and he thinks all these can be conceived only through the attribute of infinite extension. It might also be said that to designate a certain motion "going to Egypt" is to give it a "teleological" character. But this is not Aristotle's meaning. He

[4] In so far as complex means woven together, it is not a good term. It has been chosen as the best to distinguish it from compound on the one hand and simple on the other.

would not deny that going to Egypt might be the purpose; purely as such, we might even suppose it to be assigned to a march of less than a mile from here. The point is simply that if anything is going on it starts somewhere and stops somewhere. If we wish to describe it, the account must include its beginning and its end. If we describe anything less, we are simply dealing with something else.

This view is to be found in every part of Aristotle's account of nature and the world, and of knowledge. It is the explanation of his emphasis on starting-point (ἀρχή) and end (τέλος). From it follows the meaning of his much abused "teleology" and his theory of nature. Every change is determinate. It proceeds from determinate contradictory or contrary to determinate contradictory or contrary, from beginning to end. In these terms and in its type it is describable and completely describable. Furthermore the reply to a view such as that of Spinoza's is the firm denial that the determinate implies anything beyond. Touching implies the touched, but the limited as such, nothing. For in dealing with the limited or determinate, we are concerned with a whole which depends for this character entirely on internal constitution. We shall consider soon what difficulties this philosophy faces regarding possible implications of the determinate.

In any situation, therefore, in which there is a complex activity, there is one thing going on, one actuality, one activity. Its determinate single character is prior to any division. If it be actually divided, we have several different situations. The question now arises whether the complex single activity differs from the compound entirely because singulars participate in it. Does this determinateness of the subjects make the activity determinate, or is the activity in itself such? The latter seems the fairer conclusion. For a compound situation too (as in "*A* and *B* see each other") may have singulars as its subject. The division in this example, and that in "*A* is going to Egypt" or "*A* strikes *B*," are very different. Roughly we have distinguished them as *horizontal* and *vertical* division; and this difference is apparent in the activities themselves, as much as in their "relations" to their subjects. We shall have cause to consider the latter again, further on; at present it is sufficient to suggest that the singleness of the activity we have termed complex, and the singularity of its subjects are gradually apprehended *pari passu*, rather than either following from the other. For example, that "living" may be a single complex activity is discovered as much from the organization exhibited in our perception and action, as from the observation that each of us is a single body coming into contact with singulars. To separate the two sides would be a sort of vicious abstraction. In the case of "living" the conclusion is fundamental for ethical theory.

It remains now to distinguish the single simple from the single complex activity. If the latter must have a certain beginning and a certain end, the former (e.g., seeing) can have its beginning and end anywhere. It seems almost timeless and complete at any moment. (Roughly the distinction between simple and complex activities is the same as Aristotle's between ἐνέργεια in the strict sense, and κίνησις.) The second difference is that the simple activity leaves the grounds in the participating subjects for the most part unchanged; the complex activity changes their attributes, and when least, their spatial ones.

Now since complex and simple are both single activities, and give that character to their situations, and likewise compound activities are said each to belong to one situation because of some type of unity involved, it is encumbent upon us to see exactly in what the unity of the situation consists. But this has already been done; for it has been concluded that the situation is one because what is going on in it is either a single activity or somehow capable of being treated as one. But it is also a situation for the same reason. Hence it would be correct to say that the unity and being of a situation are the same. Because it has one activity it is a situation, and is one situation. If it were not one, it would not be a situation. Its being is its being a situation. This does not identify the definition of unity and being, but asserts that in the case of situations the predication of the one implies the predication of the other. Determinateness is therefore the character of being a situation or fitting into (being part of) a situation. Determinateness is the common character we have discovered of situations, their structure or form as situations. These two propositions do not give a circular explanation of the determinate, as verbally they may seem to; for we have outlined it fully in terms of activity or actuality, subjects and grounds.

The philosophy of the determinate maintains that thinking and knowing have reference ultimately to such situations, and that to be means to be a situation, or an element or part of one, or a common character of situations. Now neither to be part of one or an element participating in several, nor to be their common character, itself constitutes a situation. Hence neither propositions predicating existence on the one hand, nor those predicating identity, difference, or universal nature, on the other, describe situations. To assert that Socrates exists is to name a common element of various situations. To say that Socrates is a man, is to set forth in relation to Socrates, the common character of situations in which he and in which other individuals participate. Thus statements, when put in the traditional logical form, no longer describe actual situations, but deal with what we shall later call their *structure*. To distinguish whether a

proposition is situational or non-situational (i.e., whether it describes a situation or whether it describes structure or common character of certain situations) is not always an easy matter; in fact, to clarify this would be to develop a whole logic of situations, which obviously can not now be attempted. The following points may indicate possible lines of development:

"I see red (or this red)," describes a situation. "This is red" is non-situational, since it gives the common character of such situations as "I see this red," "*X* sees this red," etc. All judgments such as this, which, as we shall see later, ascribe potentiality, must be considered non-situational. The same is true of "this is round," which gives a common character of situations such as "I see round," "I feel a round thing," "In following the edge of this, *X* reaches its starting-point" (i.e., *X* goes round this), etc.

In connection with structure, the problem of levels of abstraction and degrees of indeterminateness is of the greatest importance; in a discussion of the situation it is not so relevant, since all situations must be equally determinate. Nor should determinateness of a description of a situation be confused with the determinateness of the situation. "*X* is sailing to Egypt" is a more determinate description than "*X* is going to Egypt," but the situation referred to is the same. On the other hand, "*X* is a sailor" gives the common character of various (voyage) situations in which *X* participates; it no longer describes a situation at all. We must not, however, fail to notice that only common character or structure and not situations themselves, can participate in the still more comprehensive situation of thinking-and-being-thought. Description is, therefore, in terms of universals; but this does not make any situation itself an abstraction.

The philosophy of the determinate further maintains that a situation is a whole, i.e., it can be understood in its own terms and factors, and implies nothing beyond it except the possibility of other situations. It does not require an infinite or indeterminate through limitation of which it may be conceived. At the same time it is here that the position we are describing meets its chief difficulties. The problem is whether the determinate as such and in itself implies anything different in character beyond itself. By the answer given we may roughly contrast types of philosophies. Aristotle's writings provide the grounds for a negative reply; at any rate, even if it is possible to deny that such would be his final answer, he certainly proves all the propositions indispensable to it. For Spinoza, the implication of determinate things and situations, i.e., of modes, is clear, if not to the imagination, at least to the intellect. Not only the fact of implication, but what is implied (infinite substance apart from which nothing can be conceived through itself) can be clearly

understood. For the Kant of the *Critique of Pure Reason*, the determinate points beyond itself. It implies something, but this something, whether one or many, is not to be understood. His position, therefore, lies between Spinoza's and the one we are here outlining. In the other *Critiques*, of course, he finds what is beyond the determinate clearer to the practical reason. Such distinctions have opened the door to attacks on thinking as a means of discovering reality, in favor of feeling, art, and religion. To these as claimants to show the way to a real not necessarily determinate, the philosophy of the determinate can only reply that knowledge consists of the known, that the known is known by knowing, that being known it must be knowable, being knowable it must be intelligible, and that intelligible means that it can be thought about. This is not an identification of reality with the intelligible, but of reality in so far as it is knowable. Knowledge is not of the situation in its total particularity; this perhaps, may be perceived, not known. But whatever activities we participate in apart from thinking, are simply not what we mean by knowing.

The philosophy of the determinate sees in the determinate as such, nothing beyond implied, except the ground of various situations, or of a more inclusive determinate, but leaves it empirically open which of these grounds may operate to actualize other situations. Aristotle says it very simply, if our interpretation of a difficult passage (*Physics*, III–7, 207b27–31) is correct, when he claims that the disproving of an actual infinite does not rob the mathematicians of their study, since they do not need it. They postulate only that a finite line may be produced as far as they wish. Referred to our present problem this means that a situation implies beyond only the possibility of a greater situation. That is all that truly can be said. Whether this be scepticism, self-restraint, or the recognition that concepts of immanent origin and application have no transcendental validity (i.e., give nonsense if thus applied), in any case it points to the conclusion that knowledge refers ultimately to situations. It may be noticed as a corollary of this position that the world as a whole is no determinate subject of discourse, being unable to enter into any situation.

The philosophy of the determinate, therefore, takes its stand on the claim that a situation is a whole, and that a whole is complete in itself. A situation is a whole because it can be understood in its own terms. The complete is limited, that is, has a beginning and an end, and the limited is not relative. Therein it is distinguished from contact.

In spite of this dogmatic assertion of a position, there remains the fact that infinite is used in many senses in which it seems to have

a meaning, and it has been made the central concept of some philosophical systems. It is, therefore, necessary for a system which denies its priority, to consider its various senses, and to explain them in terms of the situation, to show in short, that you must have a finite (in the sense of a determinate) before you can have an infinite in any sense.

There are, on the whole, three distinct conceptions of the infinite: (1) as actual; (2) as ultimate subject; (3) as substance or nature or the one formula from which endless process follows. On analysis, all these will be found to point to potentiality as the key to their explanation, necessitating its investigation first.

(1) *The Infinite as Actual.*—This, in any of the forms it may take, such as being the ultimate stuff of the world, or as characterizing some ultimate stuff, or as a character of number (i.e., the assertion of an actual infinite number as of points in the line), has been carefully and critically shown by Aristotle to lead to manifest contradictions.[5] It is true that the type of argument he uses has been ridiculed by Spinoza;[6] but the conclusion seems scarcely different. For Spinoza says: "Thence, if anyone wish to consider the matter rightly, he will see that all those absurdities (if indeed they are all absurdities, about which I am not now disputing) from which they wish to conclude that extended substance is finite, follow by no means from the fact that an infinite quantity is supposed, but that they suppose an infinite quantity to be measurable and composed of finite parts; therefore from the absurdities which thence follow they can not conclude anything else than that an infinite quantity is not measurable nor composed of finite parts. . . ." And he goes on to compare their procedure to that of one who supposed a circle to have the properties of a square, and concluded from it that a circle did not have a centre from which all lines drawn to the circumference are equal. "For corporeal substance, which can only be conceived as infinite, without like and indivisible, they conceive in order to prove it finite, to be composed of finite parts, and to be multiplex and divisible."

All this by no means really conflicts with Aristotle's conclusions. For he too decides that the infinite has not the attributes possessed by that which is finite (i.e., determinate) and actual. His argument may be stated thus: all that is actual has these attributes; the infinite can not have them; therefore the infinite can not be actual. Hence he concludes it is potential, and a consideration of his solution must await our analysis of potentiality. But Spinoza, in assuming cor-

[5] *Physics*, III—4 to 8; *De Caelo*, I—5 to 7; *De Lineis Insecabilibus;* et passim.

[6] *Ethics*, part I, Prop. XV, scholium.

poreal substance to be infinite, without like and indivisible,[7] is obviously using the term to mean something else, more in the sense of undetermined. The two arguments do not therefore clash; for each deals with something different.

(2) *The Infinite as Ultimate Subject.*—Since a subject is capable of actualization in contrary ways, and is so far indeterminate, this may be carried far enough to claim for the subject in itself a real indeterminateness. Against such a tendency Aristotle is struggling when he argues (*Posterior Analytics*—I—22) that white-wood is not the predicate of a "this," that there is not a separate subject of which white and wood are adjectives incidentally united, but that "wood" is here the subject. The opposite view, which amounts to an elimination of any distinction between essence and accident, leads either to Locke's idea of material substance as a substratum I-know-not-what, underlying groups of qualities, or Bradley's single ultimate subject, reconciling contrary predicates. Now since the "relation" of subjects and the situation in which they participate, is one of potential and actual, the nature of the subject itself and the problem involved, together with any possible solution, will become clearer on the analysis of potentiality.

(3) *The Infinite as Substance or Nature.*—This I take to be more akin to Spinoza's view of the infinite. Infinite extension as an attribute is really the common nature of extended things, at rest and in motion; and similarly one arrives at the attribute of thought. Then if, following this method, we ask what common nature there is to thought and extension, we find none except the subject-matter of logic. Apart from this, then, the unity of substance is an assumption; so under any circumstances is the infinite number of attributes. Such conclusions follow a procedure which might be called an inverted Spinozism. But Spinoza's God is more like the totality, or perhaps the unity of natures, as that from which all things flow—not in the sense of leave, but in which they are contained.

Aristotle too thinks of the nature of anything as that in it which determines it to action of some sort. In this way earth acts according to nature in falling, fire in rising. The nature of anything is a principle and cause of motion and rest, wherever the action really belongs to the subject and is not accidental. Aristotle's division of natural things from those whose action is compulsory, is somewhat the same as Spinoza's distinction between what is conceived through its essence and what is conceived through its proximate cause. On Aristotle's view the nature of a thing tends to coincide with its sub-

[7] It is interesting to note Aristotle's remark that if the infinite is substance it is indivisible; but the indivisible can only be infinite in the sense in which the voice might be called invisible (*Physics*, III—5). He means that that sense of it is irrelevant to what it really is.

stance, and of the two kinds of substance, the more proper one, viz., form or essence. But as he makes it explicit (especially in *Physics*, II—8), the action of things follows from their natures when it is entirely regular or when for the most part so. Incidentally this is the true meaning of the much maligned Aristotelian teleology, that things are such as to participate in activities which exhibit universal or general uniformities. And this means that things are acting from their natures. Spinoza, too, often identifies *natura, essentia,* and *potentia.* But he finds the individual natures or essences only conceivable through the infinite nature, whereas in Aristotle they do not seem to point beyond their determinate selves. On the contrary, if they point in any direction, it is to situations. For the nature of anything does not work as something *a tergo;* rather, to describe nature is to sketch a pattern of potentialities. If therefore potentiality be found to imply the situation as prior, without which it is meaningless, then nature can not in any sense be opposed to the determinate as infinite. This does not deny the reality of grounds, but points to their character as grounds *for* something. The point at issue here, therefore, is whether nature can be conceived as one and infinite in the sense that all flows from the one potency or whether the very character of potentiality forbids this and it becomes meaningless thereby.

We have now seen that any notion of the infinite leads to an examinatiton of potentiality. If an actual infinite is self-contradictory, the infinite must be potential. It can not be conceived as ultimate subject without being capable of contrary predicates (and capacity implies potentiality). Nor can it be the single nature from which all flows, unless it be conceived as the one potency of every happening. Obviously the philosophy of the determinate, to maintain its ground, must give an account of the growth of these three problems out of the situation, and show that they all refer to it in some sense as prior and have no meaning apart from it. This can best be done by a careful analysis of the concept of potentiality.

Before attempting this, there still lingers a doubt. For it may be questioned whether we have been describing the real, or some form in which the understanding views the real. The transition from the philosophy of the determinate with its examination of a network of related concepts, to the position that these are mental figments for ordering a given or different character not directly open to the understanding, is not a difficult one. Herein lies the attraction of phenomenalism, between which on the one hand and Spinozism on the other, the philosophy of the determinate balances precipitously. According to it, the determinate is not a mental form applied to a real different in character; it is itself part of the real. But it is not the whole

real; rather it is its structure, that part of which participates in the single activity of knowing-and-being-known, or thinking-and-being-thought, i.e., it is the intelligible or knowable part of the real. If it were the whole of it, it would have to be the participant in all our activities—perception, feeling, etc. But this the knowable as such obviously is not, and can not be, no more than if we should begin to see the audible and hear the visible. It is better to admit at the outset that knowing is not our only activity, and its all-embracing character and consequent dignity come only because it deals with common structures. But a structure is by its very nature a structure *of* something of which it is a part. Certainly the conception of structure also requires analysis in the philosophy of the determinate, to show its reference to situations and its "relation" to that of which it is the structure.[8] For the present it is sufficient to insist once more that perception, feeling, etc., are not inadequate thinking, however much thought may enter into them. We must not, therefore, mix activities, no more than we should mix drinks if we are to remain sober. Nor is it narrow-mindedness on the part of a philosophy of the determinate to refuse to concede an infinite number of attributes; for its claim is simply that what is known is known by knowing or thinking, and anything beyond, if it is to be known, will be known by the same activity or by no other. And until more is known, nothing can or should be said about it. This is not a glorification of human ignorance. It is not arrogance but self-restraint, which two, strangely enough, men find so akin as to require a keen perception to distinguish them. Hence the origin of Socratic irony.

ABRAHAM EDEL.

BARNARD COLLEGE.

ANIMISM AND MATERIALISM IN WHITEHEAD'S ORGANIC PHILOSOPHY

WHITEHEAD'S organic process is an outgrowth of the theories of Kant and James, and, above all, of Bergson. Into the continuous pure duration of Bergson it brings a quantum, or epochal character, upon which is based a theory of atomic organisms. Devised to account for the quantum, the organism, and the relativity of time, it is developed through the interplay of two logics, the organic and the material. Corresponding to these are two primary modes of prehensive unification: prehension, which is the transmission of feeling, and negative prehension, which is exclusion from feeling. Through these categories time is dependent for its objective

[8] The remarks above (page 31) concerning the impossibility of a relation between subject and activity apply here with equal force.

validity upon microcosmic animation and upon the primordial nature of God. But the theory of negative prehension is directly opposed to the main tendencies of the philosophy of organism; without it the philosophy is inadequate, with it the philosophy is incoherent. Consequently not only is the epochal theory of time dependent upon animism (the theory of feeling) for its dynamic meaning, but upon an old-fashioned materialism.

Kant's problem, how is knowledge possible, has become in Whitehead a problem of scientific philosophy, how is measurement possible? Science must depend finally upon measurement, yet what property of nature gives measurement its validity? Now that relativistic physics has called our attention to it, we can see the profound importance of congruence between systems of events for the logic of measurement. One might even go so far as to interpret recent philosophy of science as the search for the necessary and sufficient conditions for congruence, which may be defined as the intertranslatability of characters of events between different physical systems. Newtonian physics had assumed a sufficient and necessary condition for congruence in what might be called the "syntropicity" of systems; the validity of measurement was assured if the measured and the measuring systems were subject to the same forces, were characterized by the same vector conditions.[1] But with the Fitzgerald contraction and the accompanying readjustment, syntropicity was shown to be merely a sufficient and not a necessary condition for congruence. There was but one alternative: if syntropicity was a necessary condition, then measurement must be impossible beyond the limits of the Newtonian Set. But with the acceptance of the less ominous conclusion, other problems presented themselves for consideration. Was there a higher condition which might be sufficient, or both necessary and sufficient? Or must congruence be its own justification, dependent upon the particular verifiable coincidence for its basis? The latter way was that of Einstein and his followers, the former was the way of Whitehead. Einstein had provided a point of transition in his theory of simultaneity, whereby space was rendered isotropic rather than aeolotropic.[2] The right and the left, for example, must be indistinguishable in the final physical equations. Here Einstein was content to rest, looking to coincidence and an arbitrary simultaneity for his logic. But this same isotropicity furnished the basis for Whitehead's attempt to find the higher invariant underlying congruence between systems. He could state the relation between the elements of a system in terms of the stratification of the

[1] "Syntropicity" as a *logical* concept is due to Professor H. M. Sheffer of Harvard. For its application to the present problem, however, I am entirely responsible.

[2] Birkhoff, G.: *Relativity and Modern Physics*, pp. 46–47.

space-time continuum, bringing into nature properties corresponding to the tensor level of analysis.[3] The atomic actuality was the element which stratified its actual world into its own perspective with a permanent space and time. Yet, upon endeavoring to isolate the invariant which this stratification presupposed, Whitehead was driven to individual perceptivity, or the percipience of the actual occasion as organism. He failed to hit upon that property of the natural system which is, as it were, between syntropicity and perceptivity as a sufficient condition for congruence. It followed that in making perceptivity both the sufficient and necessary condition for congruence he did not get beyond a restatement of the orthodox relativistic view in terms of an objective rather than a subjective arbitrariness. Congruence depends for its definition upon the particular circumstances in which it is involved, just as does simultaneity for the Einsteinian relativists. In place of the mathemetician with his arbitrarily imposed coördinates, there is the monad with its autonomously determined definition of congruence.[4] That the latter approach is inadequate is shown in its uselessness as a concept in physical science, as contrasted with the utility of the vector concepts of force and velocity underlying Newtonian mechanics. Nor does the postulation of an "extensive connection" as a relation generating congruence add to the physical significance of feeling. The natural invariants corresponding to the tensor level of analysis have yet to be found.

The same perceptivity which is assumed to give objective validity to measurement pretends to give reality to time. Hand in hand with the revised subjectivist principle, that apart from the experience of subjects there is nothing, goes a revised cinematographic theory of time.[5] Hand in hand with the positive thesis of organism goes an unavowed antithesis of materialism. Both are grounded in the illegitimate doctrine of negative prehension, without which the theory of prehension is wholly inadequate.

Consider the problem of change. If change depends upon a feeling and mentality that are there in all actual occasions, so also must time. Change has been defined by Whitehead as the difference between actual occasions. Actual occasions themselves do not change; to admit as much would be to admit that very matter which the philosophy of organism abhors. But what are "differences between actual occasions," and how do they arise? Certainly not through merely reproductive feelings. A feeling that reproduced itself precisely forever would be the antithesis of change. It would be change-

[3] Mead, G. H.: "Objectivity of Perspectives," *Proceedings Sixth International Congress of Philosophy*, p. 76.

[4] *Process and Reality*, p. 508.

[5] *Process*, pp. 238–294.

less contemplation. But are not *all* prehensions feelings, and is not the solidarity of the universe dependent upon their reproduction? The answer to these questions is the surprising doctrine of negative prehensions: All prehensions are feelings, but some prehensions are not, namely, *negative* prehensions.[6] Negative prehensions are, on the contrary, exclusions from feeling, eliminations of those aspects in a prehended actual entity that are incompatible for the concrescence going on. Hence they are the arbiters of relevance, the guardians of subjective harmony. Nowhere does Whitehead tell just what negative prehensions are, though often enough he tells what they have to do. In truth, they are unfeeling feelings, disjunctive conjunctions, external internalities. With them, the theory of prehension is faulty; without them it is impossible. And it is negative prehensions that bring about the differences between actual occasions, by excluding from successive occasions the identical reproduction of their predecessors.[7]

Change must be a change of quality, of essential relations; therefore it requires a multiplicity of instances in which a quality can be experienced as changed, threaded by a continuity which supplies the identity of the changing. In other words, change must make a difference; thus far Whitehead is right in holding that change is the difference between actual occasions. Difference is inconceivable without multiplicity, and multiplicity without difference. Hence change demands both. But prehension is merely reproductive; like sympathy it is simply the feeling by *B* of *A*'s feeling as felt by *A;* it is a feeling *of,* and *with.* This means that there is more than a mere mirroring of feelings; feelings are transmitted directly or indirectly from one occasion to another. The feelings transmitted are the identical feelings felt by the transmitter; to repeat, they are reproduced, and *as prehensions they are reproduced without change.* Yet there is novelty in the way the prehending entity feels its object; this is the novelty of its own subjective form, and is *how* the entity responds to its prehension. And the subjective form is a function of the exclusion of irrelevant elements in the prehended entity by negative prehensions. Herein lies the difference between actual occasions, i.e., change.

Change, then, is dependent upon negative prehension, or upon the interplay between prehension and negative prehension. Where, now, do these latter get their power; what is the drive from behind that makes them change things? For answer we are referred to the subjective aim (form of the private *élan*) of the individual actual entity, which in its turn is grounded in the primordial nature of

[6] *Loc. cit.,* p. 335.

[7] *Loc. cit.,* p. 321.

God. Change, and *a fortiori* the time which characterizes it, are expressions of the divine animation.

And herewith the organism becomes infected with matter, matter none the less for its negative statement. It was Leibniz who first invented a *materia prima* as a principle of individuation for his monads.[8] The *materia prima* was a principle of exclusion, a repeated negation through which the monad became itself. Negative prehensions serve the same rôle for Whitehead. They define the actual occasion in the perspective that is its environment. And though Whitehead does not say as much, it would seem that an environment is replete with matter. In terms of its negative prehensions an entity is strikingly like the material body of Newtonian cosmology, with its external relations and its absolute space and time. Even more striking is the negatively prehended object's resemblance to the exclusive, feelingless, utterly incompatible material object of popular conception.

It seems almost as if time were to become a function of matter rather than of experience. But in fact it becomes just what one might have expected from the theory in question, it becomes a function of consciousness. A turn of the coin which has just shown up matter will reveal consciousness on the other side. Into the theory of prehension as unconscious experience comes a pervasive consciousness arising through negation. Whitehead is explicit about this: "The triumph of consciousness comes with the negative intuitive judgment. In this case there is a conscious feeling of what might be, and is not. The feeling directly concerns the definite negative prehensions enjoyed by its subject. It is the feeling of absence as produced by the definite exclusiveness of what is really present."[9] However trivial may be the mentality of an actual entity, it can not vanish absolutely, else time would vanish too, and that "actual" entity would be eternal.

Finally, the theory of simultaneity itself fails at this same weak point. In his attempt to reconcile the classical view, with its successive instantaneous spreads of nature, with the relativity of time, Whitehead has been forced to posit a durational past and a durational future. Simultaneity is intransitive, so that two occasions that are each contemporary with a third may be related successively to each other. This is required by the general theory of relativity. But it is inconsistent with Whitehead's own view of temporal succession, where the generating relation is causality. The successive events just mentioned are in the durational past or future; they are

[8] Quoted in Lynch, J. A., *Perspectives in Relation to Activity as Substance*, Doctoral Dissertation, Chicago, 1928.

[9] *Process*, p. 417.

not in the causal past or future. Yet they must be in the causal past or future to be past or future at all. The only other relation open to them is that of the negative prehension. Barring this, there is nothing for it but to precipitate a whole legion of specious pasts and specious futures along with the already questionable specious present. Yet such a relativism would be thrice static, without the fortunate intervention of mentality and God.

Whitehead's philosophy of organism, then, is not without its materialistic implications. And explicitly it is basically animistic, despite the antipodal nature of these two points of view.

But is animism as an assumption quite so vicious as it has been painted? Being for the moment as sympathetic as possible toward its claims, what virtues can we see in panestheticism? Let us assume that just as the significance of the "Copernican revolution" was in its meaning for the method of physical science, the significance of the "Einsteinian revolution" lies in the expansion of that method to a utility for social science, for "the science of tomorrow." Something of the kind is suggested by the statistical character of modern physics, and by the theory of mental measurement.[10] Then the advantage of a cosmological animism might lie in the freeing of society for social experiment. Sociology has failed in so far as it has regarded society as material; only revolutionism has grown on that assumption. To about face and look upon the universe as essentially experiential might make it less difficult to maintain an attitude of objective sympathy in social science.[11] Certainly social science requires both objectivity and sympathy; its assimilation to scientific method may lie in the extension of social categories into physical science as well as in bringing the physical concepts such as "forces" into the social context.

There is, however, aside from the difficulty most of us find in taking the leap toward animism, the fact already pointed out that feeling thus far has shown no importance at all in the conceptual scheme of physical science, however important it may be for the science of society. And it would seem that its importance for social science need not be grounded in a useless extension to nature as a whole. Nowhere in Whitehead's own writing is a social or any other justification given for his animistic bias.

What of the materialism which nestles among these unavowed presuppositions? Perhaps it too has some meanings in the demands of experience and method. Certainly the arguments of a Santayana

[10] See, in this regard, Thurstone, L. L., "The Measurement of Psychological Value," in *Essays in Philosophy*. University of Chicago, 1929.

[11] See, "The Rôle of Sympathy and Ethical Motivation in Scientific Social Research," by A. B. Wolfe, this JOURNAL, Vol. XX (1923), p. 225.

are suggestive: "Matter . . . is the principle of existence: it is all things in their potentiality, and therefore the condition of all their excellence or possible perfection."[12] But for most contemporary thinkers Santayana's excursion into the discredited realm of matter is simply quixotic. And chief among such thinkers has been Whitehead, whose philosophy of organism is intended to be militantly anti-materialistic. If, as the contemporary outlook seems to imply, materialism is an inadequate philosophy of nature, Whitehead's materialistic secret is no less deplorable than his animistic credo. In so far as materialism creeps into his system, his is a house divided against itself.

ALBERT M. DUNHAM.

HOWARD UNIVERSITY.

BOOK REVIEWS

Il problema teologico come filosofia. PANTALEO CARABELLESE. Rome: Tipografia del Senato. 1931. xi + 199 pp.

Il sistema filosofico di Josiah Royce. FERDINANDO ALBEGGIANI. Palermo. 1930.

Among the recent numbers of the distinguished series of Publications of the School of Philosophy of the University of Rome, under the direction of Giovanni Gentile, is a work in critical metaphysics which gives an interesting and fruitful direction to the type of idealism represented by this school of philosophy. The author, Professor Carabellese, makes his analysis in theological terms, but it is a fine piece of metaphysical criticism quite apart from its theological implications. In this, and in other ways, it reminds one of Spinoza's method.

The fundamental problem of the book is that of the nature of objectivity, and the major portion of the argument is the exposition of the various ways in which empirical objectivity has been confused with other things by the various philosophical traditions. The author points out how uncritically the realistic common sense which lingered in Kant identified objective being with the intelligible universals, and how Kant, in his effort to avoid the ontological argument of Descartes, insisted that these universals were purely formal. As a result, Kant was misled into a methodological treatment of the thing in itself and abandoned the attempt to discover the empirical meaning of objectivity. The idealists, on the other hand, imagined they found the empirical meaning of the objective in the idea of the Other. Carabellese shows with beautiful precision how this *negative* conception of objectivity led the idealists into a hopeless di-

[12] *The Realm of Matter*, Preface, p. v.

lemma: either the thing in itself must be abandoned, as in Hume's scepticism, or the principle of contradiction must be regarded as the fundamental law of consciousness (Hegel). Those idealists who tried to escape this dilemma were forced to deny the validity and intelligibility of experience. Such an attitude toward experience made it easy for those philosophers who thought it no disgrace to be empiricists to imagine that they had escaped the problem of objectivity by the simple device of relying on the pluralistic and relativistic character of experience. More recently the realists have tried to construct objectivity out of subjective experience, assuming, however, that the *particular* data of experience are objectively real to begin with. After this exposition of the pitfalls of others, the author points out that though Gentile's analysis of the concreteness of experience avoids these pitfalls, it leaves the problem of the nature of objectivity still unsolved, for though this philosophy begins with concrete being it consciously aims at pure being. From this point of view the nature of objectivity (or, if you choose, of God) is at least clearly defined, though merely formally, as *the* problem of philosophy, that is, as the objective of philosophical analysis. God is what philosophers will know when they have finished their task. Such a definition is, of course, purely negative or denotative and does not claim to solve the problem which it defines; its sole merit is its freedom from entanglements.

Turning to religion, the author shows in two brilliant chapters (VII and VIII) that religion has its own type of empirical approach to the objective or to God, but that, as in the case of philosophy, this approach is vitiated by confusions concerning what religion achieves. The presupposition of the philosophy of religious experience and of mysticism, that by a particular kind of experience man can secure evidence of an objectively existent God, is intelligible but unproved and probably will always remain so. For faith is by its very nature not a form of knowledge but of adoration. Religion does not know the existence of pure being, and to confuse existence and essence, as the traditional ontological argument does, only makes matters worse. But religion, or adoration, *is* itself pure being. "Religion is something with which one can not experiment, precisely because it is an acquiescence in the pure transcendental condition of experience. James experimented with religion and became a spiritist; Augustine and Francis of Assisi lived with religion as a pure faith and lost themselves in the afflatus of the Franciscan life of love, in which nature is as intimate as the internal voice is for Augustine. Franciscan existence is Augustinian faith" (p. 162).

In religion, therefore, God is in a sense realized; not because he

is known, but because he is lived or exhibited in adoration. Philosophy, which seeks to know God, can not find God in the reciprocity of *alter* and *ego,* nor among the concrete objects of experience, whether of the good, the true, or the beautiful; but it can find God immanent in its own being. God is the "pure idea" or real being of philosophical experience. The fact that experience implies an immanent objective factor makes a new type of ontological argument possible; but this God must not be confused with any existence, substance, or thing in itself whatsoever.

American readers may not find the terms and categories of the Italian philosophical tradition congenial, but it ought to be comparatively simple for them to translate Carabellese's lucid exposition and systematic argument into their own terminological idiosyncrasies, substituting, with minor adjustments, for his God, eternal objects, immediate experience, nature, or truth; and they will find in the volume much that is relevant to their own controversies and suggestive of fresh insights into traditional problems.

Even more readable, though probably less stimulating, is Albeggiani's critical exposition of Royce. This volume, and also Carabellese's, come from the Philosophical Library of Palermo, which has for years been one of the foremost centers of philosophical discussion in Italy. The author undertakes a critical evaluation of the whole of Royce's system. In this the book is not very original, or fruitful, since the burden of the author's comment is that Royce failed to solve the problems he raised and that he is notable more for his penetrating analysis of his problem than for his specious solution. This has been said by many and believed by more. But as an exposition of the development of Royce's philosophy I know of nothing so comprehensive, so intelligent, and so clear in any language. The author combines a sympathetic appreciation of Royce with a penetrating understanding of the fundamental problems at issue and he puts into a single volume of beautifully precise Italian what it took Royce volumes of voluble English to say. Very useful even for American students is the bibliography of Royce at the end of the book.

HERBERT W. SCHNEIDER.

COLUMBIA UNIVERSITY.

L'Origine et le Développement de la Méthode Expérimentale. CHI-KAI LIN. Paris: F. Loviton et Cie. 1931. Pp. 422.

This is a well-documented series of studies in the history and philosophy of experimental methods as they arose in the evolution of primitive and ancient thought and modern natural sciences. Ex-

perimentation is regarded thus as older than modern scientific practice or logical theory. Philosophically the prevailing thesis which is both the principle of selection and conclusion of Dr. Lin's researches is decidedly positivistic. The traditional associations of positivistic logic with the theories of Francis Bacon and Auguste Comte are, however, enlarged in order to account for the following historical factors: (1) the prehistoric gropings of primitive mind; (2) the magical and occult practices that persisted beyond the Middle Ages; (3) the growth of experimental techniques in the evolution of industrial processes; (4) the Renaissance methodologies of Da Vinci, Galileo, Francis Bacon, Robert Boyle, Descartes, and Leibniz which were not discontinuous with the medieval experimental theories of Roger Bacon; (5) the influence of Newton's empiricism; (6) the eighteenth-century specialization of the sciences independently of metaphysics; (7) the nineteenth-century organization of scientific philosophies on a "positive" basis (Comte, Spencer etc.); (8) the "inductive" logics of J. S. Mill, Whewell, and Claude Bernard and their influence on contemporary epistemology (mainly that of Lalande and Meyerson).

These historical extensions of the meaning of the experimental method could be deepened by further analysis of experimental procedures other than those included in the positive sciences. For instance, Leonardo da Vinci experimented as much in his painting as in his mechanics. And in contemporary thought there are attempts to extend the experimental method to social sciences, literature, drama, and philosophy itself. It is a limitation of positivistic logic to overlook these. There are many more typographical errors than the list of errata shows.

PHILIP PAUL WIENER.

PARIS, FRANCE.

JOURNALS AND NEW BOOKS

PHILOSOPHICAL REVIEW. Vol. XLI, 1. Philosophy in France, 1930: *Abel Rey.* Contemporary German Philosophy: *Arthur Liebert.* Two New Logic Books: *H. R. Smart.*

THE MONIST. Vol. XLII, No. 1. The Theory of Value: *H. H. Dubs.* Moral Inwardness: *B. W. Brotherston.* Some Questions in Aesthetics: *C. J. Ducasse.* Emile Myerson's Critique of Positivism: *A. E. Blumberg.* Some Problems in Evolution: *D. W. Gotshalk.* Negative Terms in Traditional Logic: Distribution, Immediate Inference, and Syllogism: *J. W. Miller.* The Metaphysics and Logic of Classes: *Paul Weiss.*

MIND. Vol. XLI, No. 161. Probability: The Relations of Proposal to Supposal: *W. E. Johnson.* Kant's First Moral Principle: *G. C.*

Field. Mathematics and Dialectic in *The Republic* VI–VII (I): *F. M. Cornford.* The Value of Formal Logic: *F. C. S. Schiller.* Two Problems about Duty (I): *W. A. Pickard-Cambridge.*

PHILOSOPHY. Vol. VII, No. 25. The Mathematical Aspect of the Universe: *James Jeans.* Poetry and Prose in the Arts (I): *S. Alexander.* Man the Measure of All Things (I): *P. S. Burrell.* Renouvier: The Man and His Work (I): *J. A. Gunn.* The New Cosmology in its Historical Aspect: *T .M. Forsyth.* Real and Apparent Value: *R. B. Perry.* Tradition: *Michael Kaye.*

Alexander, F. Matthias: The Use of the Self. Its Conscious Direction in Relation to Diagnosis Functioning and the Control of Reaction. With an Introduction by John Dewey. New York: E. P. Dutton & Co., Inc. x + 143 pp. $2.00.

Anthologie des Philosophies française contemporains. Paris: Éditions du Sagittaire. 1931. 533 pp. 30 fr.

Beaglehole, Ernest: Property. A Study in Social Psychology. New York: Macmillan Co. 1932. 325 pp. $3.75.

Muller, Maurice: Individualité, Causalité, Indéterminisme. (Bibliothèque de Philosophie Contemporaine). Paris: Félix Alcan. 1932. viii + 204 pp. 25 fr.

Needham, Joseph: Chemical Embryology. 3 volumes. Cambridge, England. At the University Press; New York: Macmillan Co. 1931. xxi, 613 pp.; xiv, pp. 614–1253; xiv, pp. 1254–2021. $35.00.

Nicolle, Charles: Biologie de l'Invention. (Bibliothèque de Philosophie Contemporaine.) Paris: Félix Alcan. 1931. 160 pp. 15 fr.

Ragsdale, Clarence E.: Modern Psychologies and Education. With an Introduction by M. V. O'Shea. New York: Macmillan Co. 1932. xviii + 407 pp. $2.25.

Schmitt, Carl; Nicholas Berdyaev; Michael de la Bedoyère: Vital Realities (Essays in Order 5, 6, 7). New York: Macmillan Co. 1932. 273 pp. $2.00.

Whittaker, Thomas: Prolegomena to a New Metaphysic. Cambridge: At the University Press. New York: Macmillan Co. 1931. 120 pp. $1.75.

NOTES AND NEWS

TO THE EDITORS OF THE JOURNAL OF PHILOSOPHY:

Professor Dotterer's review of my book, *The Adventure of Science,* in this JOURNAL (Vol. XXVIII, pp. 580–585) is in general so sympathetic and so considerate that I am surprised that he should come to make the criticisms that he does in connection with my treatment of relativity. He cites my use of the story of the two

twins and my statement that "it is now a matter of indifference whether we regard the sun in motion and the earth at rest, or *vice versa,*" as illustrations of my uncritical repetition of "the questionable statements of certain other popular and semi-popular expositors." The implication is that I have misconstrued the scientific principles of the theories of relativity and that I have deduced consequences from them which are in no way scientifically justified, but which are based on the errors of popularizers.

If this were true it were a grievous fault. But it turns out almost the other way around. In his attempt to refute the story of the twins, Professor Dotterer relies on the analysis of Professor Lovejoy, whereas in regard to his criticism of my interpretation of general relativity he relies on Professor Mackaye. He neglects to say, however, that both of these gentlemen, so far from attempting to introduce a wedge between the original theories and the so-called deductions of popularizers, are really impunging the validity of the original doctrines. Professor Mackaye's *Dynamic Universe* was written manifestly to contradict the Einsteinian theories, while Professor Lovejoy concludes his articles (in the *Philosophical Review,* Jan. and March, 1931) with the statement that physicists should accept Bergson's doctrine of "an indefinite multiplicity of fictitious times but only one real time." "And the physicists," says Professor Lovejoy, "are quite right in feeling that this does *not* leave the theory of relativity intact" (italics are his own). Thus Professor Dotterer's charge that I do not understand the theories of relativity resolves itself into the fact that he himself does not understand the full implications of the second-hand reasoning that he has utilized.

I am assuming that Professor Dotterer accepts the scientific validity of Einstein's formulations. If he does not, he should have stated the fact in his review. He could have written on that case somewhat as follows: "In his treatment of relativity Mr. Ginzburg accepts the orthodox view which regards Einstein's theories as sound. Unfortunately, despite their almost universal acceptance by physicists, these theories do not happen to be true, for the reasons adduced by Professors Lovejoy and Mackaye. It is a pity that Mr. Ginzburg has not displayed more independent judgment."

Had Professor Dotterer written in this wise, the issue would have been purely on the validity or our respective verdicts on relativity. I must say that I have lined up on the side of relativity, not because it is the side of the strongest battalions, but rather because I believe it is true on the basis of the evidence. (It is for this reason that I have taken the unpopular side in regard to Lamarck and Darwin.) I have made no deductions from relativity that do not seem to me logically justified, regardless who used these deductions

first, but I am always ready to be shown any fallacies that have crept into the reasoning. Thus as regards the story of the twins, the fallacy seems to me to lie rather in Professor Dotterer's objections, than in the argument as I use it. I will not take the space of this JOURNAL to refute Professor Dotterer inasmuch as Professor McGilvary has done such a thorough job in refuting Lovejoy's analysis, on which he bases his contentions (see *Philosophical Review,* July, 1931, and this JOURNAL, Vol. XXVIII, 1930, pp. 421–435). Suffice it to say that on the basis of Professor McGilvary's analysis there is shown to be nothing fallacious in the slowing up of time with relative motion, and the story of the twins is legitimate, provided it is understood that a round trip involves relative acceleration, which has to be dealt with by the more complicated relationships of the general theory, rather than by the special theory alone.

As regards Professor Dotterer's contention that the presence of inertial forces definitely proves which body is in absolute accelerated motion, I must say that it expresses a complete ignorance of the manner in which the significance of inertial forces has been transformed by the general theory of relativity. In the Newtonian system the presence of inertial forces was the criterion for distinguishing between accelerated motions, which had to be regarded as absolute and referred to real forces operating from a fixed space; and uniform linear motions, which had to be regarded as relative and which had no cause except the principle of inertia. But under the Einsteinian system the presence of inertial forces (or more properly the tendency of test objects to describe accelerated motions with reference to the frame) no longer is a sign that the frame is undergoing absolute acceleration in space, but only means that we have to do here with space and time curvature. This curvature is associated with the distribution of matter in the universe and it is responsible for accelerated motion. But the sort of accelerated motion it is responsible for is the sort that can be treated relativistically, for as we change frames we find that the observed space and time curvature changes according to a covariant law, and that in each frame the observed motion of a body follows the shortest available path in the curved space and time, according to a generalized form of the principle of inertia. The distinction of treatment for accelerated and uniform linear motion disappears, for what is uniform motion in one frame is accelerated when viewed from another frame, and in all cases the motion of a body as observed from a given frame follows the space and time curvature as evaluated from that frame.

In view of the fact that the general theory of relativity was devised specifically to carry out the relativization of accelerated motion, I am amazed to find Professor Dotterer challenging my statement about its being a matter of indifference whether we regard

the earth or the sun as at rest. My statement, qualified in the context with the proviso that we must chart events in the space and time measured from the body that we consider at rest, was simply a recognition that the fundamental aim of the theory had been successfully achieved. It is, I must insist, entirely accurate, and the monstrous inference that Professor Dotterer draws from it, namely, that it would imply that it is "a matter of indifference whether we say that the mass of the sun is 330,000 times that of the earth or that the mass of the earth is 330,000 times that of the sun," is a product of his own imagination. As a reason for this inference he gives the statement that "according to the relativistic explanation the motion of each of these bodies is determined by the curvature of the space (or space-time) in which it moves, which in turn depends on the quantity of matter in or near the region in question." It is probably here that lies the source of his confusion. Professor Dotterer seems to forget that curvature affects time as well as space and that the curvature of time is necessarily measured at the point of the observer rather than at the point where the observed object is located in the observer's spatial frame. Thus if we are observing the earth's motion from the sun, we should have to chart the motion in an intensely curved time, which curvature would be contributed by the tremendous mass of the sun. But the earth would be seen moving in a space that is slightly curved, for the spatial curvature would be contributed mainly by the earth's own mass, the sun's mass being 90,000,000 miles away. When observing the sun's motion from the earth, the conditions would be reversed. Then the sun would be moving in a region of intense curvature, but its motion would be timed in clocks that are only slightly warped. In changing our vantage points we do not destroy the invariant relationships due to the presence of the various masses in the universe, but merely decompose them into different spatial and temporal components.

BENJAMIN GINZBURG.

NEW YORK CITY.

TO THE EDITORS OF THE JOURNAL OF PHILOSOPHY:

One who insists that it is "a matter of indifference whether we regard the earth in motion and the sun at rest, or *vice versa*," can hardly refuse to admit that it is also a matter of indifference whether we regard the stay-at-home twin as in motion and the other as at rest, or *vice versa*. Consequently it must be a matter of indifference whether we regard the biological processes of the former or of the latter twin as "slowed up." If, however, we maintain that, as a consequence of his very rapid motion, the one twin becomes physiologically younger than the other, we commit ourselves to the view that it is *this* twin who is *really* in motion. In other words,

we give up the principle that all motion is to be regarded as relative.

Perhaps the solution of the difficulty is to be found in the circumstance that the general theory of relativity, with its doctrine of the "mollusc," or system of "world lines," with respect to which the traveling twin may be said to move, really brings us back again to conceptions not wholly unlike absolute space and absolute motion.

Mr. Ginzburg's justification of the mathematical possibility of treating either the earth or the sun as at rest is, I believe, perfectly correct as far as it goes. It depends upon assuming now the earth and then the sun to determine the frame of reference from which motion is to be observed. But why should we limit ourselves to only two points of view among the many that are theoretically possible?

If the hypothetical observer is stationed, neither on the earth nor yet on the sun, but on some body which is in motion with respect to both of these, the two motions are no longer interchangeable. Suppose, for example, that both the sun and the earth are observed from Mars. Then, assuming that the mass of a given body determines space-time curvature in the manner described by Mr. Ginzburg, the time of our observer would be only slightly curved (since the mass of Mars is very small), while the sun would be seen moving in a space that is very intensely curved and the earth in a space that is only slightly curved. If, now, we suppose our observer to be placed on one of the stars, as Sirius or Polaris, although the observer's time would now be very intensely curved (on account of the much greater mass of the star), the earth would still be seen moving in a space that is very slightly curved and the sun in a space that is very intensely curved.

Thus wherever our observer be stationed, except for the one position on the earth itself, he will see the earth moving in a very slightly curved space and the sun in a very intensely curved space. In other words, he will see the earth moving around the sun. Or, more accurately, he will see both of these bodies revolving about a common center. But as both bodies move about this common center the size and relative positions of their orbits will be determined by the degree of curvature of the space in which each is seen to move; and since degree of curvature depends upon the quantity of matter which is in or near the region of space-time in question in each case, the only way in which our observer could reverse the relative size and position of the two orbits would be to reverse the ratio of the masses of the earth and the sun.

Inasmuch, then, as there is clearly only one frame of reference—that of the earth itself—with respect to which the earth can be said to be at rest, and an indefinite number of frames of reference with respect to which it must be said to be in motion, it seems very mis-

leading to assert that it is a matter of indifference which phraseology we adopt. Moreover, so far as I know—here, of course, I may simply be exhibiting my ignorance—no one has ever calculated the relative masses of the members of the solar system except on the assumption that it is the earth which is revolving around the sun, and not *vice versa.*

In attempting to meet the other difficulties alluded to in my review, Mr. Ginzburg reminds us that "inertial forces" are due to space and time curvature. Are we to suppose, however, that in the block-and-coin experiment described by Professor Mackaye (*The Dynamic Universe,* p. 259), the tendency of coin *A* to move to the right is due to space-time curvature produced by the collision of the two blocks? If this is the explanation, one can't help wondering why both coins are not affected in the same way?

Perhaps the solution of these difficulties is also to be found in the circumstance that, strange as this may seem, the general theory of relativity is in certain respects less relativistic than the special theory. It recognizes a system of "world-lines" with respect to which motions must be charted. If we may limit ourselves for the moment to the spatial aspect of the space-time continuum, this implies that all motions which are mechanically significant are relative to the frame determined by the fixed stars, and that it is *not* true that *any* frame of reference is as significant as any other.

In re-writing that portion of my review in which I had the temerity to touch upon the theory of relativity, Mr. Ginzburg seems to reveal an attitude which has usually been more characteristic of religious apologetics than of logical discussion. He seems to feel that one should "line up" and declare himself either for or against the doctrine in question. But since when has it become improper to treat cosmological theories—even those of Einstein—as hypotheses, the alleged implications of which are to be compared with each other and with the relevant facts? "He that is not with me is against me," hardly seems to be the proper maxim here. Mr. Ginzburg's suggested revision would not be acceptable for the reason that I am not willing to call myself an opponent of the theory of relativity. My attitude has been that of a near-convert, whose motto has, however, remained *intelligo ut credam* rather than the reverse. It must be admitted that for some time I have been troubled by increasing doubts; and while I can not deny that some of these doubts have been suggested or strengthened by reading the writings of Professor Lovejoy and Mackaye, it doesn't help in the least to be told that these men are open enemies of the one true faith.

RAY H. DOTTERER.

THE PENNSYLVANIA STATE COLLEGE.